

REMARKS/ARGUMENTS

STATUS OF THE CLAIMS

Claims 104-111, 113-140, and 286 are pending with entry of this amendment, claim 286 being added herein, claims 112 and 194-210 being cancelled herein, and claims 1-103, 141-193, and 211-285 having been cancelled previously. Claims 104-111 are amended herein. These amendments introduce no new matter and support is replete throughout the specification. These amendments are made without prejudice to renewal of the claims in their original form and are not to be construed as abandonment or dedication of the previously claimed subject matter or agreement with any objection or rejection of record.

Claim 104 has been amended to specify that the nanostructures are discrete nanostructures, that the photoactive layer comprises a small molecule other than a dye, and that the photoactive layer is substantially free of conductive polymer. Support for the amendments can be found throughout the application. For example, see the specification at paragraphs 29, 31, 32 and 139; see also Example 3 and Figures 1 and 3. Exemplary small molecules which are not dyes are provided, e.g., at paragraph 135 of the instant application and at paragraph 154 of priority application 60/408,722, which is incorporated by reference in the instant application. Paragraph 137 of the instant application indicates that the small molecule only optionally absorbs light. Support for small molecules which are not dyes is thus implicit throughout the specification. Corresponding amendments have been made to claims 105-111, which depend from claim 104, to remove reference to a conductive polymer.

Claim 111 has been amended to recite that the small molecule is dispersed in a nonconductive polymer. Support for the amendment can be found, e.g., in the specification at paragraph 139.

New claim 286 is equivalent to claim 140 as originally filed rewritten in independent form to include all the limitations of claim 104 from which it depended, with an additional limitation to clarify that the conductive polymer of (a) was oxidized during fabrication of the device. Support for new claim 286 can be found, e.g., in claims 104 and 140 as originally filed and throughout the specification (for example, see paragraphs 133 and 136, which indicate that controlled oxidation of the polymer is a deliberate modification as is doping of

the polymer with a small molecule, indicating that such oxidation is deliberately performed during fabrication of the device).

Applicants submit that no new matter has been added to the application by way of the above claim amendments. Accordingly, entry of the Amendment is respectfully requested.

The action of October 29, 2007 included: acknowledgement of election, discussion of priority, claim rejections for alleged anticipation, and claim rejections for alleged obviousness. Applicants traverse all rejections and objections, to the extent that they may be applied to the amended claims, for the reasons noted herein.

THE INFORMATION DISCLOSURE STATEMENTS

Applicants note they have previously submitted two Information Disclosure Statements (Forms 1449), dated July 14, 2004 and July 23, 2004. An additional Information Disclosure Statement is submitted herewith. Applicants request that the Examiner indicate consideration of the citations by initialing the three 1449 documents and providing a copy to Applicants.

THE ELECTION/RESTRICTION REQUIREMENT

Pursuant to a restriction requirement made final, Applicants cancel claims 194-210 with entry of this amendment. Please note, however, that Applicants reserve the right to file subsequent applications claiming the canceled subject matter and the claim cancellations should not be construed as abandonment or agreement with the Examiner's position in the Office Action.

PRIORITY

Applicants note that the instant application as filed correctly claimed priority to U.S. Patent Application No. 10/656,802, which in turn claims priority to U.S. Provisional Patent Applications 60/452,038, 60/421,353, and 60/408,722.

In response to the Action's allegation that "Application Nos. 10/656802, 60/452038, 60/421353 do not contain subject matter such as 'controlled partial oxidation of the polymer,'" Applicants note that controlled oxidation of a conductive polymer to facilitate

charge conduction is described, e.g., in priority applications 10/656,802 at paragraph 94 and 60/452,038 at paragraph 53.

Applicants note that photovoltaic devices including nanostructures and a small molecule matrix are described, e.g., in 60/408,722 at paragraphs 121 and 130.

Applicants further note that the allegation that the disclosure of priority application 10/656,802 fails to provide support or enablement for one or more claims of this application and the Examiner's position in items 13 and 14 of the Action, which state "The subject matter claimed in the instant application is fully disclosed in the patent" for U.S. patents 6,878,871 (which issued from priority application 10/656,802) and 7,087,832 (which issued from a continuation of priority application 10/656,802), are not consistent with each other.

THE CLAIMS ARE FREE OF SALAFSKY (ACTION ITEM 1)

Claims 104-115, 118-119, 121-126, and 137 were rejected for alleged anticipation under 35 USC 102(b) by Salafsky et al. (USPN 6,239,355). To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

In order for a reference to anticipate an invention, the reference must teach each and every element of the claimed invention.

As noted above, claim 104 has been amended to specify that the photoactive layer comprises a small molecule other than a dye and that the photoactive layer is substantially free of conductive polymer. The amendments render the rejection moot, since the rejection has not established that Salafsky teaches a photovoltaic device in which the photoactive layer is substantially free of conductive polymer and includes a small molecule meeting the limitations of claim 104.

Additional points of distinction are present in the dependent claims, but because independent claim 104 is not anticipated, it is not necessary to address each additional point.

The rejection has not established how Salafsky anticipates the amended claims with respect to at least a photoactive layer substantially free of conductive polymer and including a small molecule as specified in amended claim 104. Accordingly, Applicants respectfully request the rejections be withdrawn.

THE CLAIMS ARE FREE OF SAGER (ACTION ITEM 2)

Claims 104-113, 115-119, and 121-129 were rejected for alleged anticipation under 35 USC 102(e) by Sager et al. (USPN 6,946,597; serial number verified by a call to the Examiner on January 9, 2008). To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

Again, in order for a reference to anticipate an invention, the reference must teach each and every element of the claimed invention.

Applicants note that the first charge transfer material of Sager, which the Action equates to nanostructures of the instant invention, is used to coat the pores of a mesoporous material; see, e.g., column 9 lines 3-4. Applicants do not concede that this process results in formation of nanostructures corresponding to those of the instant invention. However, in the interest of expediting prosecution, Applicants have amended claim 104 to clarify this distinction by specifying that the nanostructures are discrete nanostructures. As indicated in Figures 1A, 1C, and 1D of Sager, first charge transfer material 107 does not correspond to individual, discrete nanostructures such as those specified in claim 104. (See also Sager Figure 3.)

In addition, claim 104 has been amended as noted above to specify that the photoactive layer comprises a small molecule other than a dye and that the photoactive layer is substantially free of conductive polymer.

The amendments to claim 104 render the rejection moot, since Sager does not teach a photovoltaic device in which the photoactive layer comprises discrete nanostructures, is substantially free of conductive polymer, and includes a small molecule meeting the limitations of claim 104.

Additional points of distinction are present in the dependent claims, but because independent claim 104 is not anticipated, it is not necessary to address each additional point.

Because Sager does not teach at least a photoactive layer comprising discrete nanostructures, substantially free of conductive polymer, and including a small molecule meeting the limitations of amended claim 104, Applicants respectfully request the rejections be withdrawn.

THE CLAIMS ARE NOT OBVIOUS (ACTION ITEMS 3-12)

Item 3

Claims 114, 116-117, and 120 were rejected for alleged obviousness under 35 USC 103(a) over Salafsky in view of Alivisatos et al. (U.S. patent publication 2003/0226498). To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

As recently reaffirmed by the Supreme Court in KSR International Co. v. Teleflex, Inc. (550 U.S. ___, 82 USPQ2d 1385 (2007)), the appropriate standard for analyzing questions of obviousness is that

“the scope and content of the prior art are determined, differences between the prior art and the claims at issue are analyzed and the level of ordinary skill in the pertinent art is resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unresolved needs, failure of others, etc. might be utilized to give light to the circumstances surrounding the origin of the subject matter to be patented.

Id. quoting Graham v. John Deere of Kansas City 383 U.S. 1, 17-18.

This Graham v. John Deere standard has long been interpreted by the Office to mean that three requirements must be met for a *prima facie* case of obviousness. First, the prior art reference(s) must teach or suggest all of the limitations of the claims (M.P.E.P. § 2143.03). Second, there must be a motivation to modify the reference or combine the teachings to produce the claimed invention (M.P.E.P. § 2143.01). Third, a reasonable expectation of success is required (M.P.E.P. § 2143.02).

A recent memorandum (dated May 3, 2007) from the Deputy Commissioner to the Technology Center Directors regarding the KSR/Graham standard reiterates that, while “The Court rejected a rigid application of the ‘teaching, suggestion, or motivation’ (TSM) test,” it “did not totally reject the use of ‘teaching, suggestion, or motivation’ as a factor in the obviousness analysis.” The memo concludes that “in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed” (emphasis added). Similarly, guidelines for examination recently

published in the Federal Register (vol. 72 no. 195 p. 57526-57535) also highlight the need for "clear articulation of the reason(s) why the claimed invention would have been obvious" (p. 57528).

Application of the KSR/Graham standard in the present case indicates that the claims at issue are not obvious.

For example, the combination of Salafsky and Alivisatos fails to teach all the limitations of the claims. As described above with respect to claim 104, the rejection has not established that Salafsky teaches at least a photoactive layer that is substantially free of conductive polymer and that includes a small molecule meeting the limitations of claim 104. Merely adding nanowires, branched nanocrystals, or semiconducting materials from Alivisatos thus still fails to teach all the limitations of the claims.

In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 4

Claim 129 was rejected for alleged obviousness under 35 USC 103(a) over Salafsky in view of Simmons (USPN 5,720,827; serial number verified by a call to the Examiner on January 9, 2008). Applicants respectfully traverse this rejection.

Again, three requirements must be met for a *prima facie* case of obviousness: the prior art reference(s) must teach all of the limitations of the claims, a reason must be identified for combining the teachings to produce the claimed invention, and a reasonable expectation of success is required.

These requirements are not met by the combination of Salafsky and Simmons. First, the combination does not teach all the limitations of claim 129. Applicants note that the limitation at issue in claim 129 relates to the presence of sealing layers which hermetically seal the photoactive layer. Although the Action alleges that Simmons teaches such layers as layers 38 and 40, Applicants note that layers 38 and 40 are insulating, not sealing, layers; see column 8 lines 52-56 and column 8 line 66-column 9 line 7. Furthermore, as described

above, the rejection has not established how Salafsky teaches all the limitations of claim 104 from which claim 129 depends.

In addition, motivation to combine the teachings of the references is lacking, and there is no reasonable expectation of success since the suggested combination does not result in the present invention. Accordingly, Applicants respectfully request that the rejection be withdrawn.

Item 5

Claims 132-133 were rejected for alleged obviousness under 35 USC 103(a) over Salafsky. Applicants respectfully traverse these rejections.

The suggested modification of Salafsky does not meet the requirements for a *prima facie* case of obviousness. First, the suggested modification does not teach all the limitations of the claims. As described above, the rejection has not established that Salafsky teaches all the limitations of claim 104 from which claims 132-133 depend. In addition, as noted in the Action, Salafsky does not teach the electrode and photoactive layers oriented in a coiled or reciprocating stacked architecture. The Action alleges that because the device of Salafsky is flexible it is obvious to configure it in a coiled or reciprocating stacked architecture. Applicants note, however, that merely because the device of Salafsky is, *arguendo*, potentially capable of assuming such architectures does not mean it is obvious to form it into such configurations. No reason for doing so based on the art rather than on Applicants' disclosure has been identified. Since no rationale for modifying the teachings of Salafsky has been established, the argument presented in the Action that the reference be modified involves an improper hindsight reconstruction of the invention. Moreover, there is no reasonable expectation of success since the suggested combination does not result in the present invention. Accordingly, Applicants respectfully request that the rejections be withdrawn.

Item 6

Claims 134-136 were rejected for alleged obviousness under 35 USC 103(a) over Salafsky in view of Simmons. To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

The combination of Salafsky and Simmons does not meet the requirements for a *prima facie* case of obviousness. First, the suggested combination does not teach all the limitations of the claims. As described above, the rejection has not established that Salafsky teaches all the limitations of claim 104 from which claims 134-136 depend; e.g., the rejection has not established how Salafsky teaches at least a photoactive layer that is substantially free of conductive polymer and that includes a small molecule meeting the limitations of claim 104. Merely adding different nanocrystal subpopulations from Simmons thus still fails to teach all the limitations of the claims.

In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 7

Claims 139-140 were rejected for alleged obviousness under 35 USC 103(a) over Salafsky in view of Ono (U.S. patent publication 2003/0013008). To the extent that the rejections are applied to the amended claims, or to new claim 286, Applicants respectfully traverse.

The combination of Salafsky and Ono does not meet the requirements for a *prima facie* case of obviousness. First, the suggested combination does not teach all the limitations of the claims.

With respect to claims 139-140, as described above the rejection has not established that Salafsky teaches all the limitations of claim 104 from which claims 139-140 depend; the rejection has not established how Salafsky (and thus the combination of Salafsky and Ono) teaches at least a photoactive layer that is substantially free of conductive polymer and that includes a small molecule meeting the limitations of claim 104.

In addition, with respect to claim 140, the combination of Salafsky and Ono also fails to teach a first recombination material disposed between and in at least partial electrical contact with the first and second photoactive layers. Although the Action alleges that the third electrode of Ono "is also the first recombination material," Applicants note that the third electrode of Ono is in fact an electrode, not a recombination material. As is well known

in the art, an electrode functions by transporting charge carriers. For example, as described in paragraph 191 of the instant application, in an exemplary photovoltaic device the electrode is where electrons (or holes) leave the photoactive layer to create current flow through an external load or device and re-enter the photoactive layer from the opposing electrode. In contrast, in a photovoltaic device of the instant invention in which a recombination material separates two adjacent photoactive layers, holes created in one photoactive layer and migrating to the recombination material recombine with electrons entering the recombination material from the other photoactive layer, preventing charging of the device (see, e.g., paragraph 197). Such recombination is not a feature of an electrode such as that of Ono. Ono thus fails to teach a recombination material meeting the limitations of claim 140.

With respect to new claim 286 (which as noted above corresponds to claim 140 as filed rewritten in independent form to include all the limitations of claim 104 from which it depended, with an additional limitation to clarify that the conductive polymer of (a) was oxidized during fabrication of the device), the combination of Salafsky and Ono again fails to teach all the limitations of the claim. For example, as described in the preceding paragraph, the suggested combination of Salafsky and Ono fails to teach a recombination material disposed between and in at least partial electrical contact with the first and second photoactive layers.

As noted, new claim 286 specifies that the charge carrying properties of the conductive polymer of (a) have been altered by controlled partial oxidation during fabrication of the device. The Examiner's position, as stated in item 1 of the Action with respect to claim 104, is that the charge carrying properties of the polymer of Salafsky are altered by oxidation of the polymer since in the process of conducting holes the polymer inherently loses its electrons to the holes. Applicants note that any such oxidation which might occur would be extremely transient and immediately reversed when the photoactive layer was no longer exposed to light. Applicants do not concede that any such incidental oxidation that might occur during exposure of the device of Salafsky to light equates to controlled partial oxidation of the polymer as specified in the claim at issue. However, Applicants have written claim 286 as noted above to emphasize that the deliberate, controlled partial oxidation of interest in the instant device occurs during fabrication of the device, not

incidentally during use, to emphasize this distinction from the combination suggested in the Action.

In summary, the combination of Salafsky and Ono fails to teach all the limitations of the claims at issue. In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 8

Claims 114 and 120 were rejected for alleged obviousness under 35 USC 103(a) over Sager in view of Alivisatos et al. To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

The combination of Sager and Alivisatos does not meet the requirements for a *prima facie* case of obviousness. For example, the combination of Sager and Alivisatos fails to teach all the limitations of the claims. As described above with respect to claim 104, Sager fails to teach at least a photoactive layer that comprises discrete nanostructures, that is substantially free of conductive polymer, and that includes a small molecule meeting the limitations of claim 104. Merely adding nanowires or branched nanocrystals from Alivisatos thus still fails to teach all the limitations of the claims.

In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 9

Claims 130-133 were rejected for alleged obviousness under 35 USC 103(a) over Sager. Applicants respectfully traverse these rejections.

The suggested modification of Sager does not meet the requirements for a *prima facie* case of obviousness. First, the suggested modification does not teach all the limitations of the claims. As described above, Sager fails to teach all the limitations of claim 104 from which claims 130-133 depend. As noted in the Action, Sager also fails to teach the device in a non-planar or convex architecture or the electrode and photoactive layers oriented in a

coiled or reciprocating stacked architecture. The Action alleges that because the device of Sager is flexible it is obvious to configure it in a non-planar, convex, coiled, or reciprocating stacked architecture. Applicants note, however, that merely because the device of Sager is, *arguendo*, potentially capable of assuming such architectures does not mean it is obvious to form it into such configurations. No reason for doing so based on the art rather than on Applicants' disclosure has been identified. Since no rationale for modifying the teachings of Sager has been established, the argument presented in the Action that the reference be modified involves an improper hindsight reconstruction of the invention. Moreover, there is no reasonable expectation of success since the suggested combination does not result in the present invention. Accordingly, Applicants respectfully request that the rejections be withdrawn.

Item 10

Claims 134-136 were rejected for alleged obviousness under 35 USC 103(a) over Sager in view of Simmons. To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

The combination of Sager and Simmons does not meet the requirements for a *prima facie* case of obviousness. First, the suggested combination does not teach all the limitations of the claims. As described above, Sager fails to teach all the limitations of claim 104 from which claims 134-136 depend; e.g., Sager fails to teach at least a photoactive layer that is substantially free of conductive polymer and that includes discrete nanostructures and a small molecule meeting the limitations of claim 104. Merely adding different nanocrystal subpopulations from Simmons thus still fails to teach all the limitations of the claims.

In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 11

Claims 137-138 were rejected for alleged obviousness under 35 USC 103(a) over Sager in view of Salafsky. To the extent that the rejections are applied to the amended claims, Applicants respectfully traverse.

The combination of Sager and Salafsky does not meet the requirements for a *prima facie* case of obviousness. First, the suggested combination does not teach all the limitations of the claims. As described above, Sager fails to teach all the limitations of claim 104 from which claims 137-138 depend. Merely adding a second photoactive layer or a second photoactive layer and third and fourth electrodes from Salafsky thus still fails to teach all the limitations of the claims.

In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

Item 12

Claims 139-140 were rejected for alleged obviousness under 35 USC 103(a) over Sager in view of Ono. To the extent that the rejections are applied to the amended claims, or to new claim 286, Applicants respectfully traverse.

The combination of Sager and Ono does not meet the requirements for a *prima facie* case of obviousness. First, the suggested combination does not teach all the limitations of the claims.

With respect to claims 139-140, as described above Sager fails to teach all the limitations of claim 104 from which claims 139-140 depend; Sager (and thus the combination of Sager and Ono) fails to teach at least a photoactive layer that is substantially free of conductive polymer and that includes discrete nanostructures and a small molecule meeting the limitations of claim 104.

In addition, with respect to claim 140, the combination of Sager and Ono also fails to teach a first recombination material disposed between and in at least partial electrical contact with the first and second photoactive layers. Although the Action alleges that the third electrode of Ono "is also the first recombination material," as detailed above the electrode of Ono transports charge carriers, in contrast to a recombination material of the instant invention within which holes and electrons recombine rather than being transported through the material. Ono thus fails to teach a recombination material meeting the limitations of claim 140.

With respect to new claim 286 (which as noted above corresponds to claim 140 as filed rewritten in independent form to include all the limitations of claim 104 from which it depended, with an additional limitation to clarify that the conductive polymer of (a) was oxidized during fabrication of the device), the combination of Sager and Ono again fails to teach all the limitations of the claim. For example, as described above, the combination of Sager and Ono fails to teach a recombination material disposed between and in at least partial electrical contact with the first and second photoactive layers.

As noted, new claim 286 specifies that the charge carrying properties of the conductive polymer of (a) have been altered by controlled partial oxidation during fabrication of the device. The Examiner's position, as stated in item 2 of the Action with respect to claim 104, is that the charge carrying properties of the polymer of Sager are altered by oxidation of the polymer since in the process of conducting holes the polymer inherently loses its electrons to the holes. Applicants note that any such oxidation which might occur would be extremely transient and immediately reversed when the photoactive layer was no longer exposed to light. Applicants do not concede that any such incidental oxidation that might occur during exposure of the device of Sager to light equates to controlled partial oxidation of the polymer as specified in the claim at issue. However, Applicants have written claim 286 as noted above to emphasize that in the instant device the controlled partial oxidation occurs during fabrication of the device, not incidentally during use, to emphasize this distinction from the device of Sager.

In summary, the combination of Sager and Ono fails to teach all the limitations of the claims at issue. In addition, motivation to combine the teachings of the references is lacking and there is no reasonable expectation of success, e.g., because the suggested combination does not result in the present invention

Applicants respectfully request that the rejections be reconsidered and withdrawn.

DOUBLE PATENTING (ACTION ITEMS 13-15)

The claims were rejected for alleged nonstatutory obviousness-type double patenting over claims of U.S. Patent 6,878,871, U.S. Patent 7,087,832, and U.S. Application 11/271,484.

Applicants note that terminal disclaimers over USPN 6,878,871, USPN 7,087,832, and USSN 11/271,484 will be provided, upon indication that the claims are otherwise allowable, provided such disclaimers are appropriate at that time.

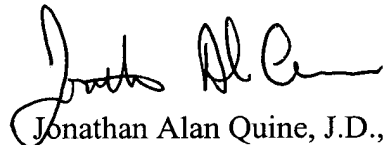
CONCLUSION

In view of the foregoing, Applicant(s) believe(s) all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the claims are deemed not to be in condition for allowance after consideration of this Response, a telephone interview with the Examiner is hereby requested. Please telephone Monica Elrod-Erickson at (510) 337-7871 to schedule an interview.

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Attachments:

- 1) A transmittal sheet;
- 2) Fee transmittal;
- 3) Information Disclosure Statement and 1449 form; and
- 4) A receipt indication postcard.